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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jiang et al. : Group Art Unit: 1742

Application No. 09/682,630 : Examiner: A.L. Oltmans

Filed: October 1, 2001 : Response to Paper No. 15

For: **Rhodium, Platinum, Palladium Alloy**

RESPONSE TO OFFICE ACTION

Assistant Commissioner for Patents
Washington, DC 20231

S I R:

This case has been carefully reviewed in light of the Office Action of 4/27/2004, in which claims 35-51 were rejected under 35 USC 103(a) as being unpatentable over Reinacher et al., U.S. Patent No. 3,622,310; and claims 52-58 were rejected under 35 USC 103(a) as being unpatentable over Reinacher et al. in view of Selman et al., U.S. Patent No. 3,640,705. Reconsideration in light of the following remarks is respectfully requested.

A detailed discussion of the applied references has been undertaken in previous prosecution of this application. Reinacher et al. discuss alloys comprising platinum, 1-49 percent palladium, and 1-49 percent rhodium, along with 0.1-5 percent of a metal such as zirconium, titanium, hafnium, tantalum, aluminum, beryllium, and the like, as dispersion strengthening additions to the alloys. Selman et al. also discuss alloys of platinum group metals with oxide-forming elements to form dispersion-strengthened alloys, and their uses in various applications, including jet engines and rocket motors.

As the Examiner has stated previously, Reinacher et al. do not explicitly disclose the compositions claimed in the present application. Furthermore, Applicants respectfully submit that the alloy compositions recited in independent claims 35, 43, 44, and 51 are not obvious in light of the cited references, in that these alloys possess properties that are unexpected in light of the prior art cited. Applicants, in response to the Office Action previous to the current Action, presented a

declaration under 37 CFR 132 by Dr. Melvin R. Jackson, a co-inventor in the present application, in support of this contention. In the current Office Action, the Examiner stated the declaration to be insufficient to overcome the above rejections because of a failure to provide sufficient evidence of new and unexpected results over the claimed range. The Examiner provided three reasons in support of this conclusion: 1. the properties alleged as unexpected are not recited in any of Applicants' claims; 2. the comparison presented in the declaration between properties for alloys inside and outside the critical range do not represent a comparison with the closest prior art; and 3. the use of optimization techniques in developing the claimed range constitute "merely a method of optimizing properties" which does not lend patentability to the claims. Applicants respectfully dispute each of these contentions.

A. Absence of properties in the claims

The Examiner contended that, because Applicants' declaration referenced mechanical properties that are not recited in the claims, "comparisons are merely relative and do not establish what is [sic] parameters are critical to the claimed invention" (emphasis original). The implication is that unexpected results must be presented for parameters recited in the claims. Applicants respectfully submit that this position is incompatible with case law and USPTO practice as set forth in MPEP 716.02(f), which states, "The totality of the record must be considered when determining whether a claimed invention would have been obvious to one of ordinary skill in the art at the time the invention was made. Therefore, evidence and arguments directed to advantages not disclosed in the specification cannot be disregarded." Applicants clearly describe the importance of a number of alloy properties in paragraph [0021] of the present specification. These listed properties include strength (which is well-known to be related to hardness) and E-alpha factor (where the E is modulus, making this E-alpha property directly proportional to the modulus). Clearly, the properties addressed in the declaration are contained within the "totality of the record" because of their close relationship to the properties described in the specification. Applicants respectfully submit that the mere fact that the compared properties were not recited in the independent claims at issue does not in any way diminish the relevance of the comparison. Moreover, the claims recite composition ranges which define alloys having the critical combination of important properties, and Applicants have asserted in previous prosecution that the composition ranges are critical to the embodiments recited in the independent claims. Applicants therefore respectfully submit that the record clearly and sufficiently establishes what parameters are critical to "the claimed invention."

B. Comparison with closest prior art

The Examiner stated, "the comparison between the compositions inside and outside the critical range do not represent a comparison with the closest prior art (i.e. Reinacher)." Applicants respectfully disagree. According to the position adopted by the Examiner in previous prosecution, the alloys outside of the critical claimed composition ranges (e.g., alloys A, B, and C in Figure B of the declaration submitted in the previous Response (13 November 2003)) represent alloys

encompassed by Reinacher. In fact, in the Office Action of 23 November 2001, Examiner Wessman stated, "Any platinum group metal or mixture of platinum group metals may be used as an embodiment of Reinacher et al.'s invention." Paragraph 5 of the 23 Nov 2001 Office Action. Alloys A, B, and C referenced above are mixtures of platinum group metals and thus constitute examples of compositions allegedly encompassed by the closest prior art, Reinacher. The Examiner will appreciate that testing all of the Reinacher "compositions" would be impossible because no specific composition range is given. Thus, Applicants have tested and provided data for representative compositions both inside the claimed range and outside the claimed range to provide the requisite comparison between the claimed alloys and the alloys of the Reinacher, respectively.

C. Routine Experimentation

The Examiner contends that the use of optimization techniques in the development of the critical ranges renders Applicants' claims unpatentable because they are the result of routine experimentation. Applicants respectfully disagree. Although Applicants used certain advanced optimization techniques in their investigation of platinum group alloys, the overall experimental program was not routine. The passage from In re Aller cited by the Examiner does not state that discovery of optimum or workable ranges in and of itself is not inventive; it is the use of routine experimentation to find the optimum range, where the prior art discloses the general conditions of the claim at issue, that renders the claim unpatentable. Applicants' work here was far from routine, and provides fundamental insight into the composition/property relationships at work in platinum group alloy systems; moreover there was no teaching, suggestion, or disclosure in the prior art that would lead one skilled in the art to experiment within the claimed composition range. As described in the two declarations provided by Applicants during prosecution of the present case, Applicants formulated several alloys of varying compositions, evaluated and characterized these alloys for a large number of specific properties, developed mathematical models based on the collected data that related alloy composition to each of these specific properties, and performed a multi-dimensional analysis which determined that a select window of compositions provided a suitable combination of properties for use in advanced turbine applications and in other high temperature components. Thus, the experimental program was no less than a determination of the fundamental relationships between composition and a number of different mechanical and thermal properties. No one skilled in the art would have been motivated to undertake such an effort based on the sweeping reference made in Reinacher to the mere use of "other metals and alloys of such metals of the platinum group including rhodium, ruthenium, iridium, and osmium." Col. 2, line 36. Such a broad statement does not disclose the general conditions of the claims at issue. All Reinacher suggests is that in nature the existence of platinum group metal alloys is a possibility.

As the Examiner has previously stated, there was no teaching or suggestion of any particular range of attractive compositions in the prior art, so the effort undertaken by Applicants was no mere "tweaking" of a variable or two in accordance with a taught relationship to find a workable range. No fair reading of the entire record could result in labeling Applicants' fundamental

work in platinum group metal science as "routine experimentation." Applicants themselves determined the particular composition-property relationships that exist for a certain alloy class, determined acceptability criteria, and found that a particular range of compositions was critical for meeting these acceptability criteria. "Generally, differences in concentration...will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration...is critical." MPEP 2144.05 (II). Applicants have shown such evidence, both using comparisons of specific alloy data for alloys inside and outside of the claimed critical range and demonstrating by way of example the results of their mathematical models fit to their experimental alloy characterization data (see, for example, Figure A of the most recent declaration). " 'Evidence that a compound is unexpectedly superior in one of a spectrum of common properties...can be enough to rebut a *prima facie* case of obviousness.' No set number of examples of superiority is required." *In re Chupp*, 816 F.2d 636, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987), *quoted in* MPEP § 716.02(a). The alloys within the range are clearly, and unexpectedly, superior to alloys outside the range. No one skilled in the art could have predicted the stark difference in properties for alloys inside vs. outside the claimed range because, until Applicants' performed their experiments, no one knew about the complicated composition/property relationships Applicants determined.

In short, Applicants respectfully request reconsideration of the above rejections because the evidence presented in previous declarations is sufficient to establish the criticality of the claimed ranges. The evidence presented clearly establishes composition ranges that are critical to the claimed inventions, presents a comparison between the claimed invention and the closest prior art, and provides details of an advanced experimental program that fabricated and tested materials and from the resultant data generated new, fundamental information about the relationships between composition and properties. The evidence further shows that the performance of alloys within the claimed composition ranges is clearly superior to that of the prior art. Applicants respectfully submit that the claims are allowable over the applied prior art.

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Respectfully submitted,

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16 July 2004